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The Massachusetts Medical Society

SHATTUCK LECTURE.*

THE PREVENTION OF HEART DISEASE —A NEW PRACTICAL PROBLEM.

BY HAVEN EMERSON, A.M., M.D., NEW YORK.

It is said, with much truth of us as physicians, that we know more facts than we use, that it is not knowledge but the application of it that is desired of us. Even at the risk of entering the lists of the propagandists and promoters, of abandoning the fruitful and tempting paths of scientific study for the sake of exploiting well known facts, I venture to distract you for the brief period of our meeting, from your devotion to treatment of the individual, and to encourage your ever increasing interest in a phase of preventive medicine which seems to me to offer a new field of triumph to our profession.

Theodore Janeway, in the Shattuck Lecture of 1916, said: "The need of the moment, therefore, is for more knowledge; not more knowledge of the dangers of circulatory diseases for the public, which means propaganda, but more knowledge of their causes for the physician, which means ceaseless investigation." And so the need of the moment was, and still the need exists, and always will, and yet there is so much known of causes of deaths that might have been postponed, of sickness that should have been abbreviated, of resources for salvage of the handicapped, that we can no more await the complete array of facts before mobilizing our resources than we could justify withholding vaccination until the etiology of smallpox is established. So, while the strongest call to the physician will, and always should, be to ferret out the causes of disease and ever extend the realm of preventable disorders, and while the voice of such rare and precious students and teachers as Theodore Janeway still calls clearly and true to the clinician, the physiologist, the pathologist, to combine in their assaults upon our own ignorance and nature's secrets, may there be heard also the plea for those whose lives are jeopardized because of lack of industry in the use of the tools of our trade already sharpened and at hand.

In speaking of cardiac disease, let me, for convenience, include the four titles of the international list of causes of death: angina pectoris, pericarditis, acute endocarditis, and organic heart disease, which, in spite of minor errors, have been used with fair consistency for many

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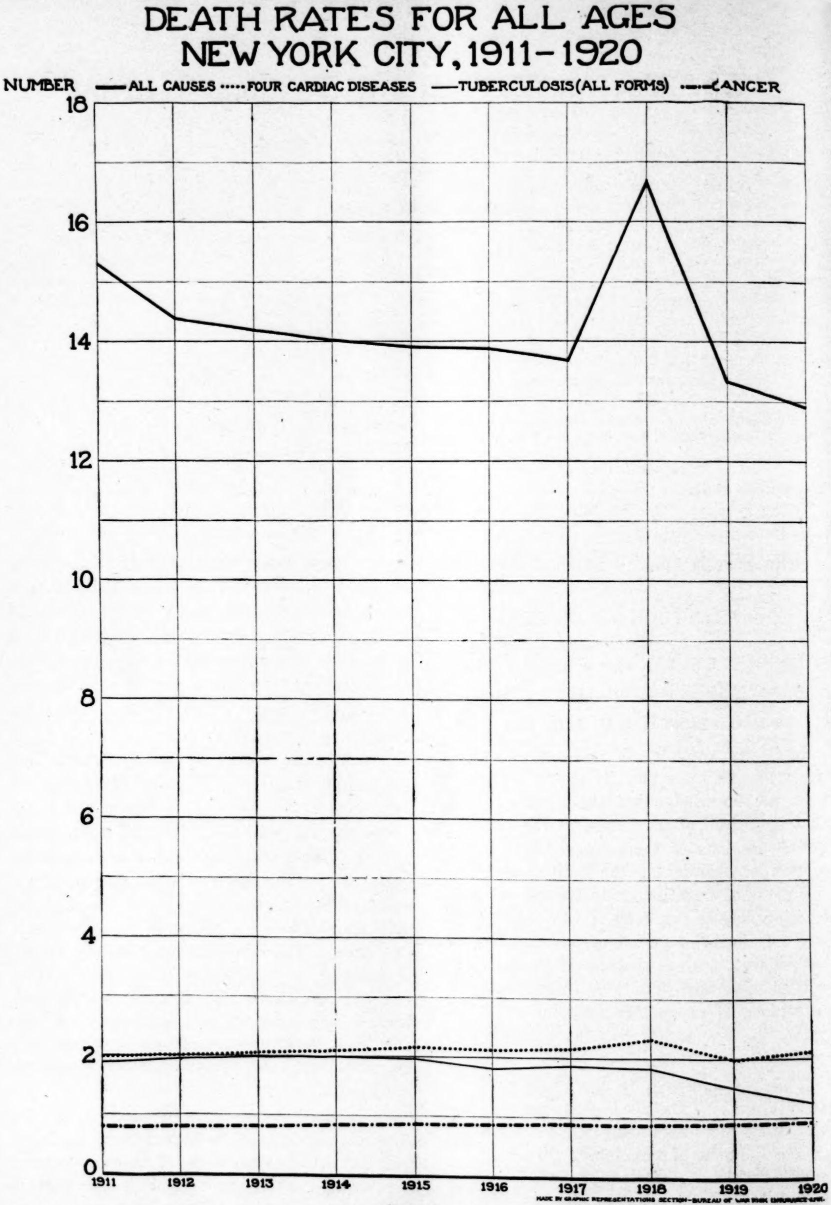
*Presented at the Annual Meeting of the Massachusetts Medical Society, Boston, May 31, 1921.



MADE BY GRAPHIC REPRESENTATIONS SECTION—BUREAU OF WAR RISK INSURANCE-[illegible]

Chart A.

years, and with such uniformity as the shifting fashion of clinical nomenclature permits.

My objective will be to persuade you that it is within the realm of possibility, within the reach of present day medical and social knowledge and resources to make as much reduction in sickness and premature death from heart disease as has been obtained by teaching, by diagnosis, by organized medical services in the control of tuberculosis. We have seen first one and then another of the national volunteer efforts in preventive medicine abandon the exclusive methods and arguments of the fanatic, the dramatic appeals of the hobbyist, and arrive at a stable program of endeavor which accepts and includes the facts that disease control depends on a general elevation of the health of all people, and that no age, sex, occupation or race group can long maintain an advanced position of healthfulness without the interest and assistance of all the rest.

The tuberculosis campaigners first recognized that their own special problem could best be helped by their engaging in attack upon all sickness. The devotees of the unborn babe, of the school child, of the blind, and latterly the banded hosts attacking venereal disease and mental disorders, have all come to see the unity of their interest in, and dependency upon, the general health level of mankind and his environment, whether in home, shop, or field.

The infant, the almost embryonic effort at control of our greatest single group of causes of death, at the very start finds its success or failure inextricably bound up with those various preventable diseases of infection, of occupation, of habit, of inheritance, which play a dominant part in the lives and hazards of each age group. In one sense, then, we cannot escape the conclusion that the chief excuse for singling out heart diseases as worthy of selected attack is that we can, perhaps, in this way obtain attention and consideration for a large group of the unnecessarily handicapped, and rouse a determination to put an end to recruiting among the healthy childhood of the nation for the invalids of middle age.

Following the methods of the epidemiologist, let us outline the bulk and location of our disease group. Without going into ponderous details, one can see at a glance the uniform and practically universal preëminence of the heart diseases as a cause of death.

While, up to ten years ago, tuberculosis kept pace with organic heart disease for first place among the causes of death, recently the steady decrease in deaths from all forms of tuberculosis has left heart disease in a position of single eminence. Deaths from the four heart diseases, in New York City, during the past ten years, have been at no time less than 200 per annum per 100,000 of population, and since 1915, all forms of tuberculosis have caused less than 200 deaths annually per 100,000 population, and in 1920 caused not more than 126 per 100,000.

On Chart "A" are shown the crude death rate per 1,000 of population, the death rates for the four cardiac diseases, for all forms of tuberculosis, and for cancer, in New York City, for the years 1911 to 1920.

The following table gives the figures from which the chart was drawn:

Death Rate Per 1,000 of Population	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
All Causes	15.30	14.41	14.21	14.03	13.93	13.89	13.70	16.71	13.35	12.93
Four Cardiac Diseases	2.	2.01	2.07	2.11	2.17	2.13	2.17	2.32	2.00	2.13
Tuberculosis, all forms	1.89	1.96	1.99	2.00	1.96	1.82	1.88	1.84	1.52	1.26
Cancer	.79	.82	.83	.87	.88	.88	.90	.89	.92	.93

In the state of Massachusetts, with an estimated population of 3,827,329, as of July 1, 1919, there were 7,596 deaths from the four cardiac diseases during the year, or a rate of 198.4 per 100,000; the rates for these diseases separately being, for pericarditis, .7; acute endocarditis, 7.; angina pectoris, 9.7; and for organic heart disease, 181. per 100,000 of the population.

When we study the distribution of these deaths throughout the year, we find a curve of incidence not very different from that of the respiratory group of diseases. (Chart "B"). The heavy loss of life from cardiac diseases occurs in the months of October to May, and when respiratory disease is prevalent, of whatever nature, the deaths from cardiac diseases rise at once. The uniform distribution of cancer is shown in comparison with the seasonal variations of pulmonary tuberculosis and organic heart disease in the experience of New York City for the years 1914-19.

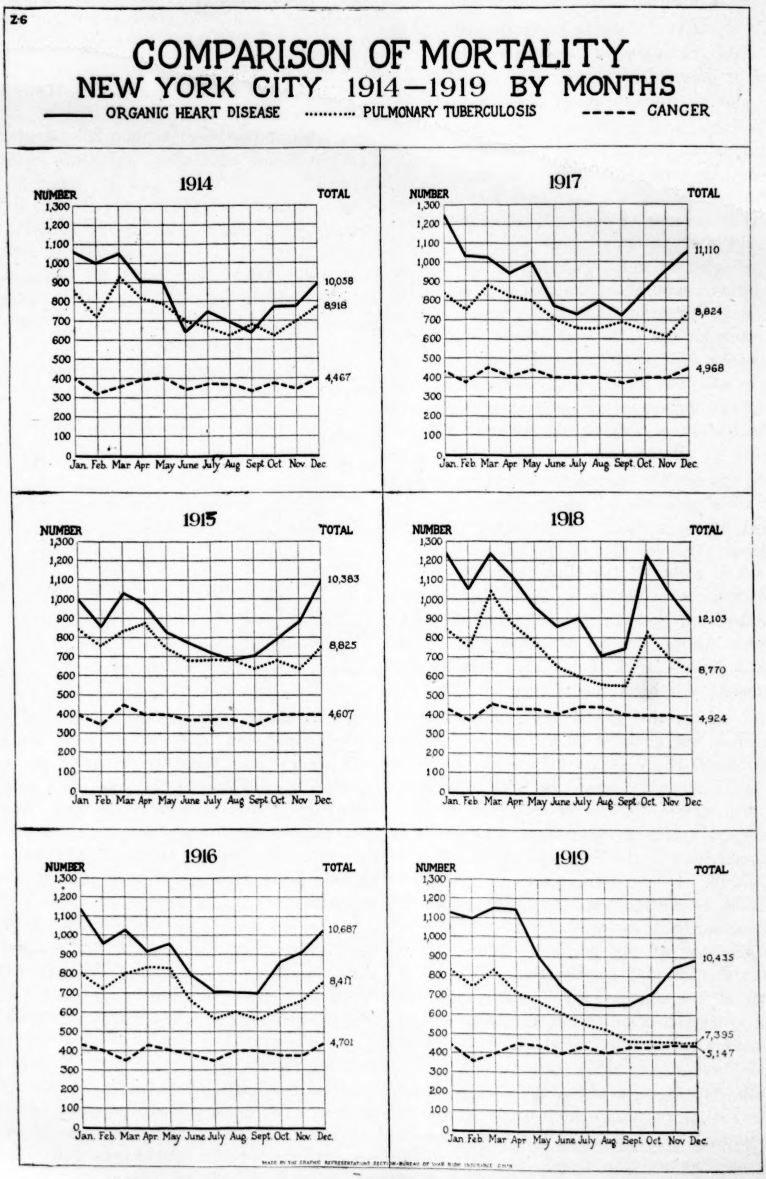


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CHART B.

That this is not merely an urban phenomenon can be seen from Chart "C," which shows the assembled experience of the same six years in the rural population of the registration states of the United States, representing an experience of 261,609 deaths from cardiac disease in a population rising from 30,520,275 in 1914.

The table from which the Chart "C" was drawn follows:

Number of deaths from organic diseases of the heart, by month of death, 1914 to 1919, in the rural part of the registation states as constituted in 1914.

Year	Number of deaths from organic diseases of the heart.												
	Total	January	February	March	April	May	June	July	August	September	October	November	December
Rural part of Registration States as of 1914*													
1914	40,726	3,959	3,537	4,140	3,807	3,526	3,044	2,945	2,860	2,915	3,062	3,225	3,706
1915	42,755	3,964	3.624	4,480	4,152	3,556	3,144	3,175	3,039	3,025	3,264	3,271	4,061
1916	44,645	4,854	4,116	4,301	3,807	3,764	3,422	3,276	3,033	3,098	3,285	3,571	4,120
1917	46,354	4,865	4,375	4,416	4,093	4,066	3,642	3,369	3,094	3,208	3,603	3,530	4,093
1918	46,388	4,328	4.017	4,309	4,258	3,826	3,377	3,291	3,100	3,259	4,539	3,776	4,308
1919	40,741	4,251	3,601	4,058	3,755	3,599	3,010	2,982	2,843	2,674	2,942	3,323	3,703
Totals													

*Exclusive of North Carolina, which included only municipalities having a population of 1,000 or more, but less than 10,000, in 1910.

NOTE: "The "rural part of registration states" embraces the area outside of municipalities of 10,000 population or more in 1910. The estimated midyear population, 1914, of the rural part of registration states" as of 1914 is 30,530,275, based on the Federal censuses of 1900 and 1910.

The same regular seasonal variation appears and the similarity of the curve of 1914 to that of the combined six years is striking:

The year 1918 is shown to illustrate the two peaks of high death incidence caused in the rural areas of the United States registration area, as in the urban population of New York City, by the 1918 epidemic of influenza. Chart "D" records the same facts as Chart "C," but by the methods of ratios instead of by the method of differences.

A still further evidence of the similarity of cardiac disease death rates among all groups of population is found in the experience in New York City and State, for example, in 1920. Here the death rate per 1,000 of the population from organic heart disease, acute endocarditis and angina pectoris combined in New York City (population, 5,665,148) was 2.13; in the state, exclusive of New York City, (population, 4,785,586) was 2.40; and in the rural population of New York State (population, 2,258,717) was 2.50, an increase which could only be adequately explained by an analysis of the age groups of these three populations.

Analysis of cardiac deaths by age groups shows their relation to deaths from all causes. (Chart "E.") Here the death rate at the several age groups per 1,000 living in the group, is indicated as rising gently from early infancy until the age group 35-45, when the rate rises rapidly.

While the death rate from cardiac diseases in the age group 25-30 represents 9.1% of all deaths at this age group, the cardiac disease deaths at the age group 35-45 are 13% of all deaths at this age group, and cardiac deaths at the age group 55-65 are 23% of all deaths at this age group.

The figures from which Chart "E" was drawn are given in the following table:

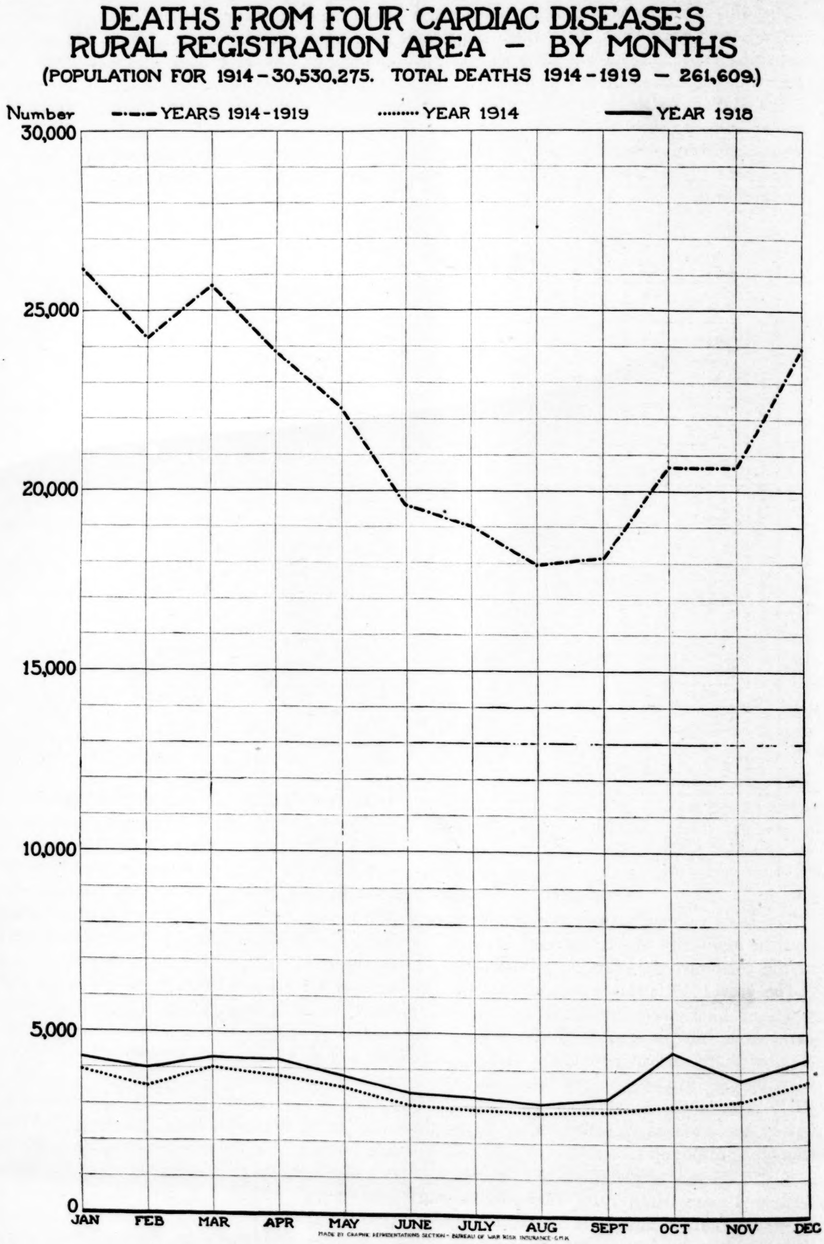
Rates for 1000 population at age groups.

	Under 5	5-10	10-15	15-20	20-25	25-30	30-35	35-45	45-55	55-65	65+
All Causes	31.8	3.5	2.	3.	4.3	5.6	7.7	11.6	22.3	44.8	103.4
Four Cardiac Diseases	.14	.33	.41	.39	.38	.51	.79	1.47	3.91	10.09	30.10

On further splitting up our problem into its smaller elements, it will be seen by a study of Chart "F" that pericarditis, angina pectoris, and acute endocarditis play a relatively insignificant part in the total deaths from cardiac diseases at whatever age group. Distributing the deaths from the four cardiac diseases for the ten years 1911-20 in New York City by 18 age groups, we get a picture from which we can draw valuable lessons for a preventive campaign. Whatever measures we may find suitable to apply will certainly have to bear largely upon the age groups under 15.

This chart shows the actual differences in numbers of deaths at each age group, and in this method of graphic representation much is lost which can be shown best by using the semilogarithmic method, or the chart of ratios (Chart "G").

Here the same facts are recorded as appear



MADE BY GRAPHIC REPRESENTATIONS SECTION – BUREAU OF WAR RISK INSURANCE – G.M.H.

CHART C.

on Chart "F," but the per cent. of increase from one death to 10 has the same value in the curves as the per cent. of increase from 10 deaths to 100, or from 1,000 to 10,000. By this method one can exhibit on the same chart the differences of age group distribution of deaths from cardiac disease, such as angina pectoris, with not more than 400 deaths at any one age group, and deaths from organic heart disease with 13,000 at the same age group. If we plot statistical curves of widely different magnitudes on the same drawing, and if our object is to compare not only the amounts of increase or decrease, but the percentage rates of change, there is only one correct method: the semi-logarithmic chart.

The almost uniform number of deaths from acute endocarditis at each age group up to 55, and then the sharp drop, and the quite similar curve of pericarditis deaths contrast sharply with the sky-rocket curve of angina pectoris in the age groups over 15 years, and the more gradually mounting curve of organic heart disease to the age group 60-65.

The significance of the variation in deaths at the several age groups would be largely lost if we relied only upon the chart of differences (Chart "F"), instead of using the method of ratios, as shown in Chart "G."

To quote from a brief statistical survey of the importance of cardiac deaths, by Louis I. Dublin:—

"Under 25 years of age, organic heart disease causes as many deaths as typhoid fever;

"Between 25 and 34 years, organic heart disease causes as many deaths as lobar pneumonia;

"Between 35 and 44 years, organic heart disease causes more deaths than Bright's disease;

"After 45 years, organic heart disease shows a higher death rate than any other cause."

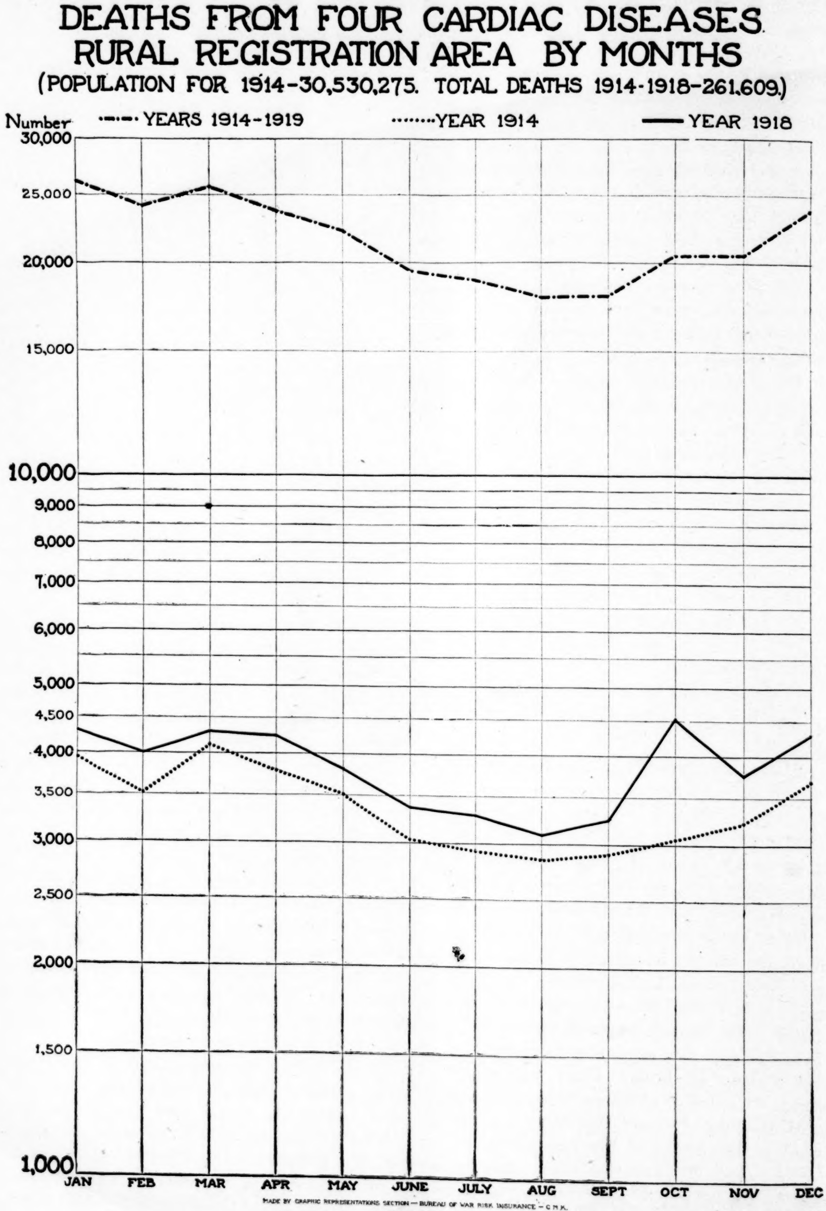
Of the amount disbursed in death claims by the Metropolitan Life Insurance Company in 1920, over $5,000,000 were paid on account of deaths from organic heart diseases. To quote further from the same statistical bulletin of the company (February, 1921), with regard to loss in expectation of life on account of organic heart diseases, we learn that there is a curtailment of two years of life expectation among females, and one and two-thirds years among males, this loss being heavier among white people than among colored. This loss in life expectation is greatest about the age of five and continuous up to and beyond the age of 75, as can be seen from the accompanying table:

	WHITE		COLORED	
Age	Male	Female	Male	Female
0	1.67	1.98	1.57	1.87
1	1.86	2.17	1.87	2.18
2	1.91	2.21	1.97	2.29
3	1.94	2.24	2.01	2.33
4	1.95	2.26	2.03	2.35
5	1.95	2.27	2.03	2.37
15	1.93	2.25	2.08	2.43
25	1.89	2.23	2.15	2.54
35	1.88	2.19	2.23	2.60
45	1.87	2.12	2.17	2.44
55	1.81	1.99	1.95	2.11
65	1.56	1.68	1.62	1.68
75	1.19	1.21	1.27	1.23
85	.96	.82	.99	.85
95	.41	.42	.33	.38

Whether or not cardiac diseases are increasing as causes of death, need not concern us here, and it is, to say the least, doubtful whether any valid thesis to this effect can be maintained in view of the lack of uniform methods of diagnosis and certification of death from generation to generation. It would appear that the last twenty years have developed an increase in death rates from cardiac diseases, especially at the older age groups, but the elements of error are too great for us to accept any such statements as final.

We are in the same dilemma in our study of heart disease as we are in most other matters of disease prevalence, since deaths and death rates bear about as much relation to the problem of the suffering human as the ash dump does to the life of the industrial plant. We have no adequate morbidity data of any disease, and the methods of survey of hospital, dispensary, or private practice experience leave much to be desired. Although we can estimate with considerable accuracy the true incidence of typhoid fever, from deaths occurring from this disease, we have no ratio of percentage based on any recorded experience to indicate how many people in a community are in all probability suffering from heart diseases when we have recorded the deaths. We have certain broad experiences, however, that approximate the truth probably as nearly as we can in tuberculosis.

About 5% of the men called in the drafts were rejected because of disabling heart disease. About 2% of the food handlers in New York City were found to have clinically important heart disease. About 2% of life insurance applicants are rejected because of cardiac disease. About 2% of the children in school populations are found to have some cardiac disorder.



DEATHS FROM FOUR CARDIAC DISEASES.
RURAL REGISTRATION AREA BY MONTHS
(POPULATION FOR 1914-30,530,275. TOTAL DEATHS 1914-1918-261,609.)

MADE BY GRAPHIC REPRESENTATIONS SECTION — BUREAU OF WAR RISK INSURANCE — C.H.K.

CHART D.

Further study of the latter experience, the only one of the four so far followed through by systematic medical and nursing supervision, shows that probably not more than one-half of those with signs of cardiac abnormality of sound or function are suffering from disorder of such nature as to require medical care and direction. Taking the community as a whole, we may be within the truth if we estimate that not more than 2% and not less than 1% of the total population at any time need care and medical assistance because of heart disease.

The percentage of children in public and parochial schools of New York City found to have cardiac diseases among those examined by medical inspectors of the Department of Health, is shown in the following table:

	1915	1916	1917	1918	1919	1920
Number of Children Examined	278,174	276,611	328,190	247,735	248,978	243,418
Number with Cardiac Diseases	1.5	1.9	1.8	1.6	1.5	1.3

In sickness surveys made by the Metropolitan Life Insurance Company, which included the experience among 571,757 persons, organic diseases of the heart were exceeded only by external violence, rheumatism, influenza, pneumonia, tuberculosis, diseases of the stomach, and apoplexy as disabling sicknesses.

A gradual increase in the incidence of cardiac diseases and chorea among 356,292 school children during their school years, as found by examinations by the medical inspectors of the New York City Department of Health, has been reported by Dr. S. Josephine Baker, both boys and girls showing about twice as high an incidence of both these groups of disorders at ages 14 and over, as they are found to have at the age of eight.

To follow the method of presentation so effective in attracting the attention of laymen to the seriousness of the tuberculosis problem, we may say with reasonable accuracy that cardiac diseases are responsible for one in every six or seven deaths (tuberculosis is responsible for one in every ten deaths). More than one per cent. of the entire population is suffering from some form of organic heart disease (one per cent. has active pulmonary tuberculosis).

There are from five to nine cases of heart disease for every cardiac death per annum (there are probably nine to ten known active cases of pulmonary tuberculosis for every death from this disease per annum).

It will be accepted, therefore, that the detection of cases of cardiac diseases in their incipiency is important to the community for the prevention and postponement of disability and death. As in the wise plan for the control of tuberculosis, periodic medical examinations, especially trained consultants to counsel with the general practitioner, and medical supervision of school children and industrial workers have been found effective, so we may expect similar benefit by the same methods in an attack upon heart disease.

There is lacking any clinical or pathological information upon which could be based even a presumptive curve of the incidence of cardiac diseases by age groups.

The ages at which the communicable diseases chiefly occur, which we believe are responsible for the majority of cases of valvular and muscular diseases of the heart, certainly fall in the age groups under 35, and a majority before the age of 10, and perhaps, the largest number for any one age group before the age of 5.

In support of this very general statement, permit me to report upon the experience of some of the special cardiac clinics of the Associated Cardiac Clinics in New York City. A total of 6808 patients are reported upon, of whom 4392 were active cases on May 1, 1921; that is, were in regular attendance or under supervision of the visiting nurse of the clinic.

Among the adults of this group, the histories of 927 appear to have been so carefully analyzed as to permit of a sound opinion as to the probable causative infection, as follows:

In 331 cases,	acute rheumatic fever
207	acute tonsillitis
122	syphilis
78	scarlet fever
47	diphtheria
14	pertussis
54	measles
163	carious teeth
7	chorea
927	

Of these patients, 614 were active cases in regular contact with the clinics on May first.

In attempting to obtain similar facts from the histories of the children attending special cardiac clinics, the problem is more difficult, be-

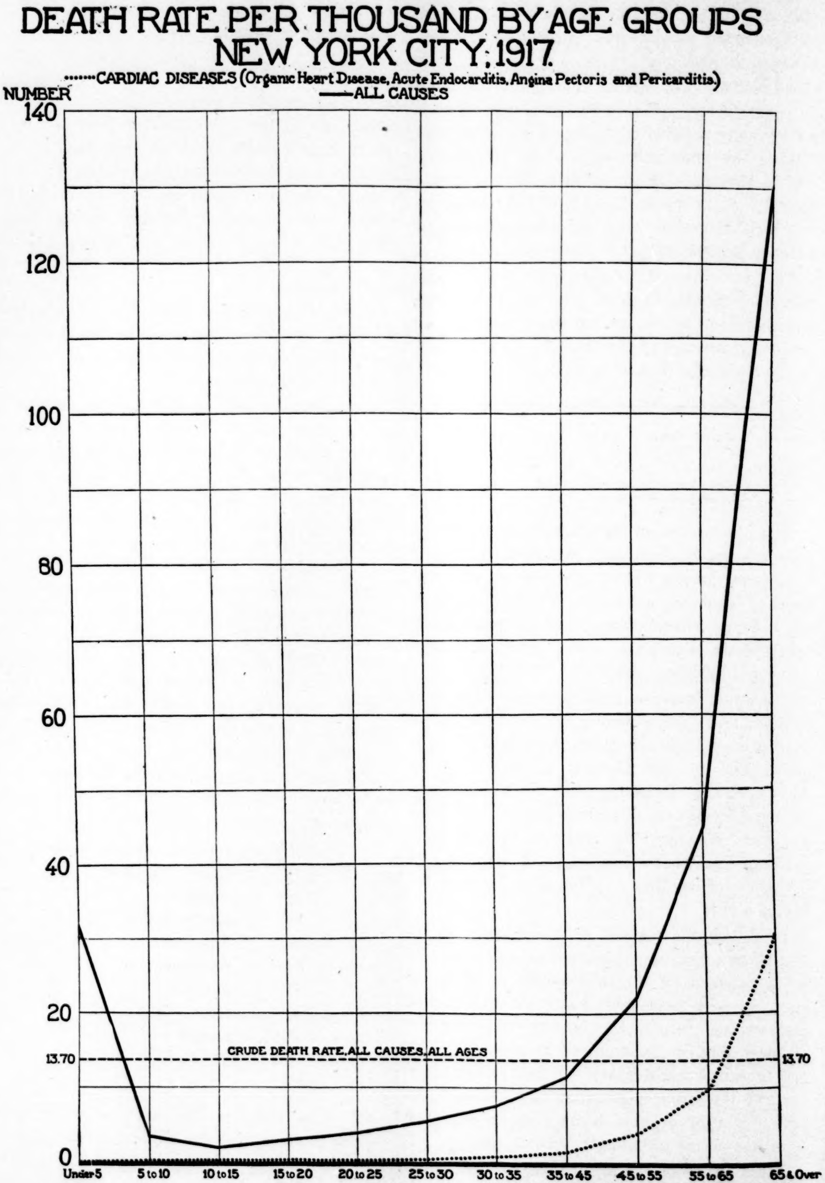


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CHART E.

cause the records show all the infections, and in many instances several prior to the onset of reported symptoms of heart disease. In most instances the clinic physicians have quite properly refrained from committing themselves to the particular one of several infections which was thought to be the actual exciting cause of the cardiac involvement.

Among 720 children patients at these cardiac clinics where case histories were particularly well reported and studied, infections as possible or probable chief etiological factors were given as follows:

(Two or more of the following infectious conditions were reported in many cases.)

In 279 cases,	acute rheumatic fever (growing pains, etc.)
282	acute tonsillitis or sore throat
—	syphilis
53	scarlet fever
63	diphtheria
130	pertussis (at one clinic only)
232	measles
207	carious teeth (none at one clinic)
49	chorea (none at two clinics)

Ledford[1] has recently reported that in 86.8% of a group of 250 cases of acute endocarditis in a children's hospital ward, the cardiac infection followed directly acute rheumatic fever, chorea, or tonsillitis. So sharp-cut a statement can rarely be made for the patients who come with an established valvular heart lesion and a history of a multitude of infections. While the ultimate classification of all or even the most important direct etiological factors in causing organic heart disease must await more precise knowledge we can, for convenience in guiding the always elusive public health educator and propagandist, with safety state that of the infections, syphilis and rheumatism are positive causes, that diphtheria, typhoid fever and scarlet fever are presumptive causes, that measles and whooping cough are under serious suspicion, that infected tonsils and diseased teeth and cryptic foci of various kinds may, in many cases, prove to be the true cause of what is called rheumatic or cardiac infection, that senescence, arterial hypertension with or without renal disease, and the insidious diseases of occupation which are often mistakenly reported as arteriosclerosis, play a large but wholly undetermined rôle. The elements leading to extension of existing lesions, to the disturbance of mechanical equilibrium of a heart developed to compensate for an orderly and well adjusted activity, are so multifarious and fall so clearly within the clinical field that I shall make no attempt to comment upon them, except to say that from the assembled reports of many patients under specialist clinic control in New York City, the impression grows constantly stronger that re-infection and a state of poor nutrition and inadequate sleep and rest are more common, potent and serious causes of renewed or original decompensation than are sudden overexertion of physical strain in play and work. It becomes more apparent that the immediate needs of the clinician and the remoter but none the less vital needs of the community can be met best by a central office or library of clinical records assembled on sound statistical lines.

What is important to obtain but not yet available, is a careful clinical and pathological study of the age at infection or onset of valvular or other organic heart disease. The material is now at hand and developing day by day in the practice of a multitude of physicians throughout the country, but is nowhere assembled, and, as a rule, the fact of cardiac involvement after any infection is not recorded or remembered, and the date of onset or invasion is a matter of mere guess work when the mechanical end results of the disease have brought the patient under medical care.

Among dispensary patients, most of the children have had the usual communicable diseases and frequently, also, have passed through attacks of the respiratory diseases, such as pneumonia and influenza. Reliable history by parent or child as to the prior importance or even occurrence of rheumatic or tonsillar infection is rare.

While referring to the clinical material under observation at 29 or the 31 cardiac clinic classes in New York City, for which reports have been available, it is worth while to consider the relative adequacy for the estimated need of a community for the services now provided in New York City in this field. Here again, we can with benefit use as a basis for comparison the well established services of the tuberculosis dispensaries. There are, and have been for a

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[1] Ledford, H. P.: American Journal of Diseases of Children, February, 1921, 21, No. 2.

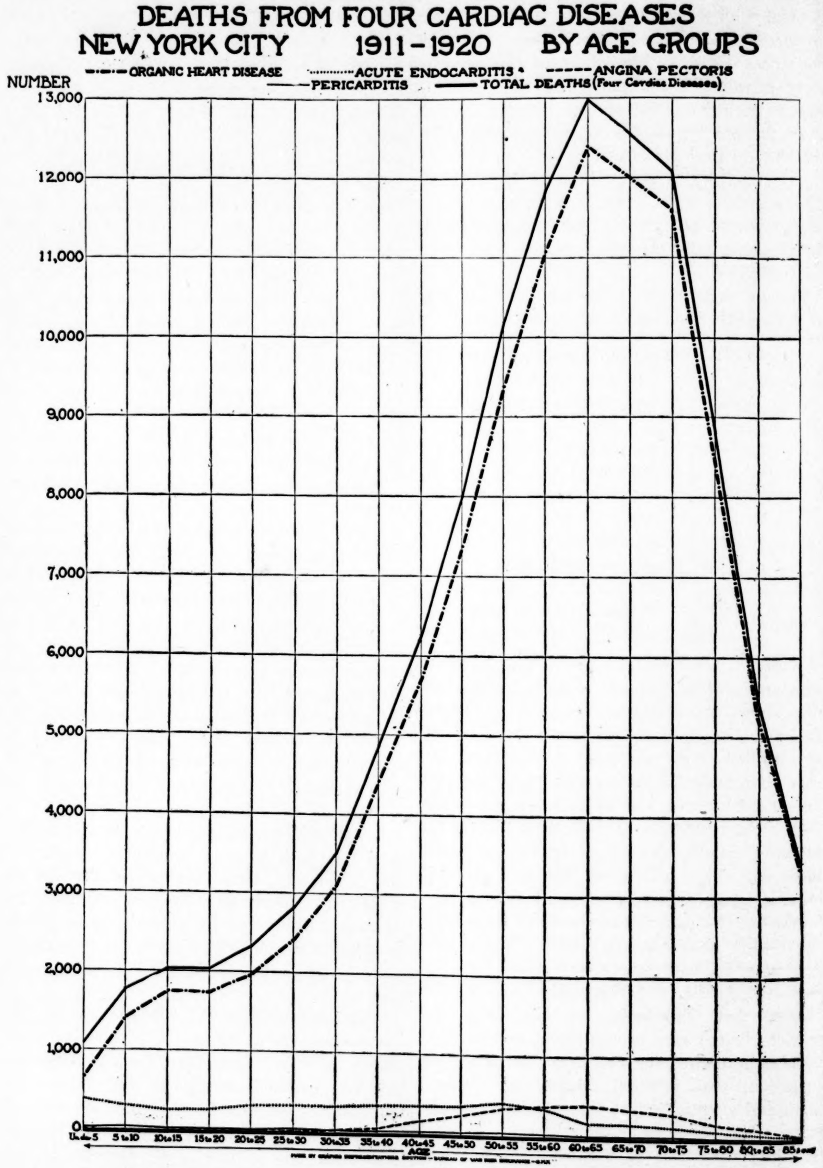

DEATHS FROM FOUR CARDIAC DISEASES
NEW YORK CITY 1911-1920 BY AGE GROUPS
ORGANIC HEART DISEASE
ACUTE ENDOCARDITIS
ANGINA PECTORIS
PERICARDITIS
TOTAL DEATHS (Four Cardiac Diseases)
NUMBER
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Under 5
5 to 10
10 to 15
15 to 20
20 to 25
25 to 30
30 to 35
35 to 40
40 to 45
45 to 50
50 to 55
55 to 60
60 to 65
65 to 70
70 to 75
75 to 80
80 to 85
85 & over
AGE

Chart F.

number of years, in operation in the five boroughs of New York City, 29 tuberculosis dispensaries, and their number and distribution have been found reasonably adequate for the needs of the community, this provision amounting to 10 clinic hours of medical services per week for each 100,000 of population, as compared with 20 in Boston, 13 in Philadelphia, and 10 in Cincinnati, cities in which the field is considered to be well covered. (There are reported to be 550 tuberculosis dispensaries in operation in the United States).

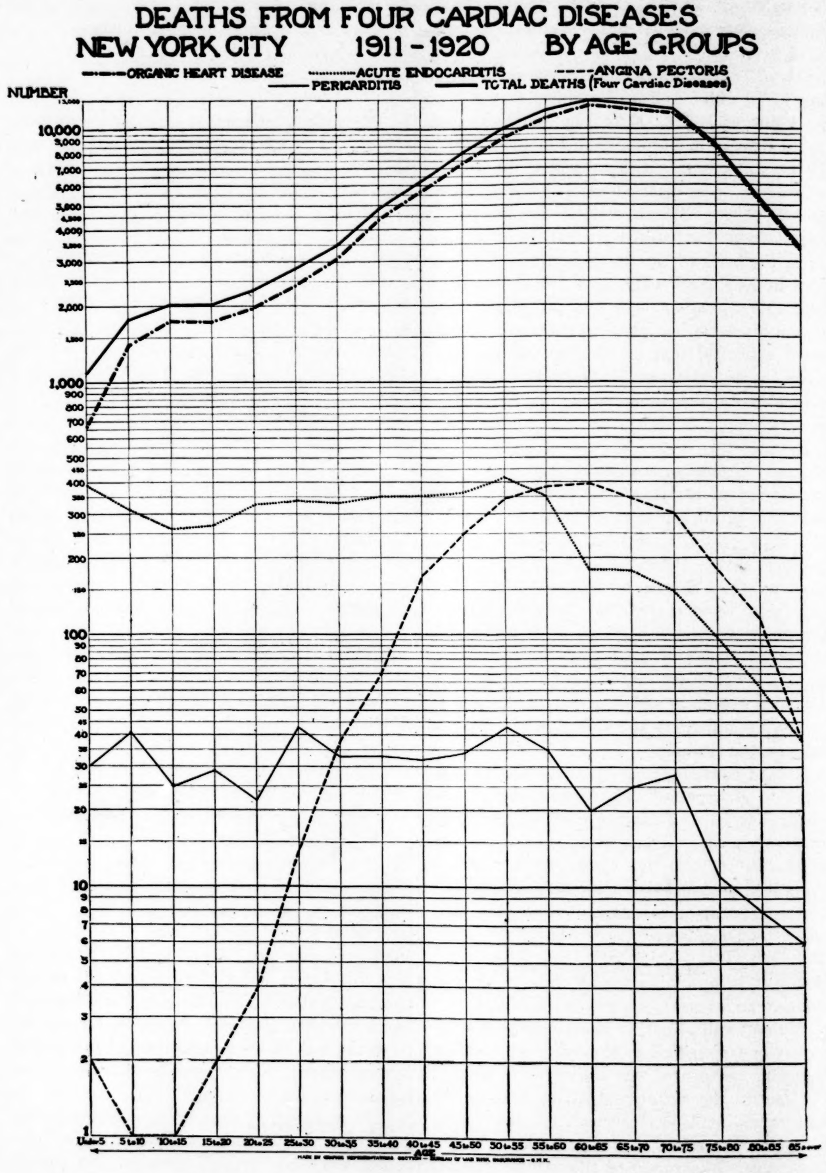
On the basis of the death rate from tuberculosis in New York City, 1920, we can estimate that there are 35,660 active pulmonary cases of the disease, of whom about 27,000 are registered with the Dept. of Health. Of the registered cases, 11% are in attendance at or in contact with the tuberculosis dispensaries, or approximately 3,000. Although we may consider that 2% of the population have cardiac diseases, probably not more than 1% of the population at any one time needs medical supervision for this reason, or 56,651 in 1920. On the basis of the experience with tuberculosis, we may expect about 8.5% of estimated active cases to accept dispensary care, or 4,815. However, since the period of years in cardiac diseases for which medical supervision is desirable is, in the main, much greater than is the case in pulmonary tuberculosis, we may expect a larger attendance year in and year out, from the same unit of population, at cardiac clinics than at tuberculosis clinics.

It is of considerable interest to note that the estimate of expected attendance and needs for dispensary care of cardiac diseases closely approximates the current facts, since there are upward of 4500 active cases in attendance at the 31 special cardiac classes in dispensaries now in operation throughout New York City. The attendance is given accurately for 29 of the 31 classes (4342 on May 1st), the last two having been put in operation too recently to have developed an accurately recorded clientele.

Without going further into the subject of the extent and distribution of cardiac diseases and accepting as proved the major importance of the deaths, the sickness at all ages, the urban and rural incidence, the seasonal distribution of deaths, the effect on life expectation in both black and white races, of the cardiac diseases, and admitting that we are yet without the important facts as to the exact etiologic factor in all cases, or the ages at which the various determining infections occur, let us turn to the problem of providing for such relief from this incubus upon our fellow citizens as we are capable of.

If we look the country over and search for an effective demonstration of an effort to bring to the aid of those already afflicted the best that the medical sciences and social organizations are capable of, I think you will agree with me that the Association for the Prevention and Relief of Heart Disease in New York City must be recognized as having most nearly approached the goal. If we may, as we love to do, think back to the time when what we see now in operation was a vision in the mind of one practical idealist, it seems to me we must give Dr. John Huddleston, the friend and adviser of a multitude of the handicapped and the suffering, full credit for the conception of much of our present program. He had grown up with, and played a leading part in, the development of tuberculosis control and service, of care and prevention, over a period of twenty years before his death, in 1915. He was convinced of the need and the opportunity to organize the always willing but individualistic services of physicians, and the generous but sentimental public for the early detection of heart diseases in children, the provision of such hospital and convalescent beds for those with acute infections as will permit of rest and recovery, instead of permanent mechanical damage of muscle and valves, the orderly and controlled supervision by doctors and nurses devoted to this highly technical specialty, of all those whose usefulness and safety depends upon their learning, as in a post-graduate university of applied hygiene, their limitations and their possibilities, the provision of such guidance in school, shop and employment agency for child and man as will set at naught the handicap of the heart by intelligent selection of occupation. The proof that this vision was that of a prophet as well as of a scientist, is the astonishing rapidity with which the ideas took root, the eager workers fell to at the task and the realization of the project has approached a very considerable refinement and success.

It is a matter of especial satisfaction to the associates of this good physician that a fund collected by his devoted patients was turned over to a group of physicians to administer and use in defraying the expense of studies in the



DEATHS FROM FOUR CARDIAC DISEASES
NEW YORK CITY 1911 - 1920 BY AGE GROUPS

CHART G.

problem of home and dispensary direction of children with cardiac diseases. Another fund, for special research work in cardiac disease, has recently been created by Mr. Frank G. Sturgis. The facts as to organization, costs, plans and results of this distinctly medical undertaking can all be more appropriately read from the reports and publications of the Association than in this lecture.

A program for control of heart disease for a city so nearly the population of the Boston metropolitan area, namely, Cleveland, Ohio, as to be entirely applicable to Boston, was prepared a year ago in collaboration with the officers of this Association, and is published as part of the Cleveland Hospital and Health Survey (1920, Part ii, pp. 213-220).

The more important professional results of this movement in New York City have been, first, the assembling for a common purpose of a particularly keen group of students of clinical cardiac disease and their organization into a professional association ready to undertake such mutual studies and to establish such common standards of reports, methods, terminology, etc., as are prerequisites for study of the small army of patients already reporting daily for orders at the dispensaries. Already a terminology is in effect which permits of a common language in discussing patients in bulk, and plans are well advanced for such use of clinic records and their central tabulation and collating that the separate physicians will each be making his important contribution without bearing the, to him, distasteful burden of clerical and statistical analysis. The following terminology is in general use in the dispensary care of cardiac patients in New York City:

FUNCTIONAL CLASSIFICATION OF CARDIACS.

ORGANIC HEART DISEASE.

Class I. Patients who are able to carry on their *full habitual activity.*

Class II. Patients able to carry on *diminished physical activity.*

- *A. Slightly decreased.*
- *B. Greatly decreased.*

Class III. Patients who are able to carry on *no physical activity.*

POSSIBLE HEART DISEASE.

Class IV. Patients who have abnormal physical signs in the heart, but in whom the general picture, or the character of the physical signs leads us to believe that they do not originate from cardiac disease.

POTENTIAL HEART DISEASE.

Class V. Patients who do not have any suggestion of cardiac disease, but are suffering from an infectious condition which may be accompanied by such disease: *e.g.*, rheumatic fever, tonsillitis, chorea, syphilis, etc.

This organization has served to remind us of the unlimited fields of clinical research that can and must be cultivated apart from laboratories, or even hospitals, and carry us into countless homes, the final answer to our questions depending upon the record of a life time. Can we, perhaps, tell our children what is the true cost of a life time of heart disease to the community and to the individual? With 6,000 patients to study, some of the still disputed questions of the etiology also will soon be answered.

For those who wish to undertake the operation of a special class for either children or adults, a warning must be given as to the danger of overloading with patients who cannot be continuously followed up. It is no less dishonest in a dispensary than for a private practitioner to accept responsibility for more patients than he can thoroughly well care for. It is found that not more than 150 active cases can be adequately examined and followed up by one special class. What is considered adequate personnel for one class holding one session a week is:

One physician @ $3.00 an hour	$450 a year
One full time registered nurse	$1800 a year
Clerical help @ $.50 an hour	$100

Space, and suitable office equipment and supplies, light, heat and telephone service, can usually be provided in an existing dispensary plant. A transportation fund will be needed to permit the nurse to visit patients for follow-up, unless the population served is in a small area adjacent to the dispensary. The exact information is not yet available, and yet a sufficient number of cases have so far been studied to make it quite clear that by an expenditure of not to exceed $15.00 a year, not only can the great majority of active cardiac patients be so guided and supervised as ambulatory patients, from the dispensary or at their homes, that periods of hospital care ($3-$5 per day) are less frequent and of shorter necessary duration, but that the earning capacity of the adults, and the school attendance of children, is increased far beyond the money cost of the dispensary care. As it costs less to save an infant life than to provide its burial expenses, so investment in medical supervision of cardiac patients pays truly astonishing dividends in services to the community and in happiness of life for these handicapped people.

In addition to the 31 special classes for cardiac disease in New York City (14 for children and 17 for adults, several of the latter in the evening), there are known to be in operation 28 more in other of the larger cities in the country.

Albany	1
Boston	8
Chicago	4
Cleveland	1
Des Moines	1
Detroit	1
Iowa City	1
Long Branch	1
Milwaukee	1
Minneapolis	2
Philadelphia	4
Rochester	1
St. Louis	2

The most effective and constructive service for prevention and relief of heart diseases is that close coördination of school and clinic found where the examination of the children picked out by the school medical inspector is taken up by a clinic class operated in the school district, the chief of the cardiac class becoming the specialist adviser for the school and home career of the cardiac school child, just as the tuberculosis specialist has guided the anemic and pre-tuberculous child in the open air classes of the public schools.

There are now 12 special cardiac classes in the public schools of New York City (about 550 open air classes for the pre-tuberculous) each class of about 25 children.

The most ambitious program and the most nearly perfect facilities for school and clinic care of cardiac school children is to be found in the three special classes at 8th Street and Avenue B, where they occupy a building apart from the regular school buildings, provided with certain conveniences, elevators, rest rooms and exercise space, etc., asd their entire régime and individual prescription for physical training, rest, etc., is under the direction of the special clinic at the New York Post Graduate Hospital (Dr. Robert H. Halsey and associates). Details of results of the work in this special group of patients, showing the progress in school attendance, development of cardiac balance, increase in physical fitness, etc., will be presented at the meeting of the American Medical Association next week. It may be stated that one-third of the children picked out as having some cardiac defect of sound or function are found to be in need of medical direction for definite organic cardiac disease. There is great benefit to children in relieving them from the fear of the term, "heart disease," and teaching them how normal and natural their lives may be within wide limits. Supervision produced a gain of 13.5% in school attendance. Expressed in school days, each child gained three weeks of school attendance under special clinic and class care.

The clinicians of these special cardiac classes have before them the questions put to you by Theodore Janeway in 1916: "Whence came these diseases and why? What are their primary, and what their accessory causes? How do they reach their baneful development? On finding the right answer to these questions, depends the final attainment of the goal of our profession, the prevention of disease. By as much as the proverbial value of prevention exceeds that of cure, does the importance of study of the causes of disease surpass that of the manifestations, its results, or its treatment."[2]

We see heart diseases as we have found tuberculosis, venereal diseases, cancer, infant mortality, and blindness, preventable by a multitude of means, each aimed against a specific fact or a direct or immediate effect. Such standards have been put into effect in clinics successfully operated for a number of years, that detailed consideration of their functions, objectives and accomplishments need not be repeated. What is, I believe, the best description of the most complete and efficient medical organization for cardiac children during the non-hospital periods of their lives, has been given in the *Hospital Social Service Quarterly* by Dr. Wm.

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[2] Janeway, T. C.: "Etiology of the Diseases of the Circulatory System," Shattuck Lecture, BOSTON MEDICAL AND SURGICAL JOURNAL, June 29, 1916.

P. St. Lawrence and Miss E. Louise Adams, the nurse in charge.

This class for cardiac children at St. Luke's Hospital has been operating for five years and has made important additions to our knowledge of methods and results. While we see the correction of many evils in progress under guidance of such clinics as this, it is well to review the situation of the cardiac child where it lacks special provision. St. Lawrence and Adams have well described it in the introduction of their paper. "In our general Pediatric Clinic, few cases have presented a more pathetic and discouraging outlook than the cardiacs. Their care has been haphazard and, undoubtedly, in many instances, improper. As their lives have been restricted almost to the point of uselessness, they have been a burden to their families and to themselves. Their education and development have been sadly neglected and, in many cases, it has seemed questionable whether life for them was worth while. They have repeatedly sought help which we have not known how to give. In the cases with milder lesions, we have unnecessarily made life a burden. The severer cases have been too forcibly impressed with the certainty of the coming outbreak. Our management has been without plan and has consisted largely of meeting the individual symptoms. In many instances, this has only meant waiting for the eventual failure, with the hospital ward as the ultimate refuge. Discharge and return home has been but the first phase of another cycle, and not infrequently the final cycle was early brought to a close."

The studies upon cardiac tolerance in children, by Dr. May Wilson, at the Nursery and Childs Hospital, the studies under the Huddleston Memorial Fund, by Dr. Charles Hendee Smith and his associates, both already reported upon, and the studies of Dr. John Wyckoff at the University and Bellevue Hospital Medical College Cardiac Class, in etiology and duration of the disease in adults, are a few of the important contributions to medicine of these new clinical services.

Through the courtesy of Dr. Wyckoff, I am permitted to give you the preliminary results of a study of 200 cardiac patients reported from his clinic, as follows:

Of the 100 patients in whom rheumatism, tonsillitis and chorea, together or separately, played probably the exciting etiological rôle (65 males and 35 females), they were distributed as follows, by decades: 10 to 19 years, 24; 20 to 29 years, 39; 30 to 39 years, 16; 40 to 49 years, 15; 50 to 59 years, 5; 60 to 69 years, 1; total, 100.

Of those giving a history of syphilis as the probable primary cause, the distribution was: 30 to 39 years, 3; 40 to 49 years, 8; 50 to 59 years, 10; 60 to 69 years, 2; total, 23.

Of those evidently secondary to some particular septic process, the distribution was: 10 to 19 years, 1; 20 to 29 years, 1; 30 to 39 years, 4; 40 to 49 years, 1; 50 to 59 years, 1; total, 8.

Of the remaining 69, there were secondary to nephritis, 1 at 40 to 49, 2 at 50 to 59, and one unknown; total, 4.

Of the other 65, which include senile and, probably, those of arterial and renal origin, the distribution was: 10 to 19 years, 6; 20 to 29 years 12; 30 to 39 years, 12; 40 to 49 years, 11; 50 to 59 years, 19; 60 to 69 years, 3; 70 to 79 years, 2; total, 65.

Grand total, 200.

The distribution to early decades of those of so-called infectious rheumatic origin was to be expected, and the location of syphilitic hearts in the decades after 30 is also in agreement with the usual incidence of syphilis in the population as a whole, or at least the occurrence of the structural sequellae.

A further analysis of the 100 cases with a probable rheumatic tonsillar or chorea origin, according to the period which elapsed between the date of probable infection and the date when the patient knew he had a cardiac disease, either from appreciation of the importance of the subjective symptoms or by direct statement from a doctor, shows that, on the average, these patients did not know that they had cardiac disease until 5.36 years after infection. The periods, of course varied widely from cases where knowledge was immediate at the time of the acute sickness of origin, to those who had evidently had their disease 30 years before they knew what was the matter with them, a measure of the failure of the patient and the physician to meet, and the latter to meet the full need in each case.

Of the twenty-three syphilitics, the average time before knowledge of their cardiac involvement was 17.65 years after infection (the range being from one to 34 years after).

A further interesting point is the length of time after knowledge of infection before patients first attended a clinic. Of the 100 of the rheumatic group, the average delay was for 8.5 years after knowledge of infection before the patient appealed for relief at the clinic, and with the syphilitic group of twenty-three, the period was 21.4 years.

These are practically all patients of the dispensary class, in whom economic limitations have probably prevented their using medical advice as early as they would have been tempted to if the necessity for continued work had not been so pressing, but the figures are sufficiently impressive to guide us in much of our preventive program.

The cardiac is entitled to education as to the merits of early diagnosis and the difficulties of cure or relief in advanced stages of these diseases, as the tuberculous are, and there can be no doubt that the educational campaign to reach the incipient tuberculous has born fruit, for the percentage of negative cases on first examination and the percentage of incipient cases in the clinic attendance have increased with great rapidity in recent years.

As it was with the tuberculosis movement, so in the present effort to bring service to the cardiac, we find the pressure and initiative strong from the ranks of the social workers' profession. One of the first problems considered by the Hospital Social Conference in New York some ten years ago was the provision of convalescent care and suitable vocational direction, training and employment for handicapped cardiac dependents. No adequate or consistent professional service for cardiac patients can omit the two elements which chiefly contribute to a shortening of periods of total disability, namely, the adjustment of the patient to a substantially gainful occupation suitable to his mental and physical capacities and the completion of the hospital treatment by a convalescent training which will lead directly and, under medical supervision and encouragement, into work instead of dependency. The chronic cardiac, no less than the chronic tuberculous, is always in danger of losing his moral fibre, the essentials of character upon which self-support and self-respect depend, because of the failure of even our best technical medical services to inject into their therapy the element of moral stamina and an outlook of hope and determination instead of permitting a subsidence into the easy indolence of those who enjoy their invalidism.

For information and helpful suggestions as to the problem of employment for cardiacs, and the way it may be met, clinicians, as well as relief agencies and hospital administrators, should study the reports of Mrs. I. M. Duggan, Director of the Employment Bureau for the Handicapped of the Hospital Social Service Association of New York City. The conception of this problem from the hospital point of view, has been nowhere better expressed than in the following paragraphs from Mrs. Duggan's second paper in the *Hospital Social Service Quarterly,* 1920, 11,227:

"As Emerson[3] has well expressed the situation, the hospital enters into a tacit contract with each patient it accepts, that it will try to reach the cause of his disease. But is the hospital, in reality, living up to the spirit of its contract if it does not help a cardiac find a lighter job after his first admission? Is the hospital not squandering trust funds to spend money to treat a patient if they know that the good work done will be quickly lost if he returns to his old occupation? If the proper treatment of a cardiac is not drugs, but a change of occupation, should this not be supplied, just as an operation would be given free to a hernia papatient, or quinine to a case of malaria? But objection is made to the cost of supplying the machinery necessary for this placement work. The cost of finding a cardiac lighter work is far less than the cost to the same hospital of this cardiac, who will return repeatedly for longer and longer periods if he is allowed to undertake his former occupation.

If the hospital superintendents would only realize how many days of hospital care could be saved their institutions by the proper employment of cardiacs upon their discharge from the hospitals, we would see an employment bureau for cardiacs, supported by the hospitals themselves, established in every community."

In the field of convalescent care, there have been no more valuable contributions to our knowledge of the technic of institutional care, occupational and recreational training and resources for the immediate post-hospital period for the cardiac patient than have appeared from the experience of the Burke Foundation Convalescent Home at White Plains. The reports and recommendations for this particular type of medical service presented in the last few years by Dr. Frederic Brush, show an increasing accuracy in determining the kinds of patients for whom a wide range of activities are not only permissible but necessary, and a courage in breaking paths into fields of work and play heretofore forbidden to the cardiac.

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[3] Emerson. C. P.: Hospital Social Service Quarterly, 1919, 1, 263.

As a mark to set for future accomplishment by the hospital services of a community, we may use estimates for the need of convalescent beds. If, as seems probable, on the basis of experience in our large cities, we need about five general hospital beds for every 1000 of the population and for every 100 of the hospital patients discharged from care, 12 will need institutional convalescent care (this number to include provision for those needing convalescence, and coming from dispensary and private care), we find that one out of every five convalescent beds will be required for cardiac patients (2/3 of the beds for children under 14). The cost of such care, even including transportation and admission office expenses, is about half the daily cost of hospital care in general hospitals. In New York City, of the 500-600 beds considered necessary for cardiac convalescents for its population, 300 are already available, and others are in preparation. Tentative conclusions have been arrived at for the guidance of those wishing to obtain convalescent care for cardiacs after hospital and dispensary treatment and are here quoted from proposals considered by the Associated Cardiac Clinics of New York City:

"I. Convalescent homes should accept patients with heart disease only after they have been examined at a cardiac clinic.

II. Patients proposed should be held to the following types:

1. Those needing convalescence for other conditions than heart failure, but who may incidentally have heart defects (under Class I of the classification of cardiac patients, as adopted by the Association).
2. Convalescents from acute heart failure, who have been out of bed for some time, in the hospitals or at home, and who show no dyspnea after moderate exercise. (Classes II and III of the classification of cardiac patients, as adopted by the Association.)
3. Patients who are not convalescent from acute heart failure, but who show signs of heart and general fatigue while under observation at the clinic, and who need shorter preventive stay. (Class III of the classification of cardiac patients as adopted by the Association.)
4. Younger persons yield best results and are given preference. [*Note.*—Too few persons are sent of the types indicated under 1 and 3, above.]

III. The following types of patients are not considered suitable for convalescent treatment:

1. Convalescent from acute rheumatic fever, not to be sent until joint symptoms have been absent for three weeks.
2. Cases that show lung congestion, or a tendency to bronchitis or asthma.
3. Persons with marked renal complications.
4. Those mentally, nervously or otherwise unpromising for the essential active coöperation and long stay. This would include patients who are likely to develop homesickness, or who might be unable to adapt themselves to a régime.

IV. The following coöperation shall be given by the submitting agencies:

1. Help to lessen the strain and fatigue of the admission day (transportation to admission office, etc.).
2. Hospitals should take back patients at the beginning of a relapse that may develop while at the home.
3. Social service should follow up cases promptly on their return to the city, to prevent relapse which frequently occurs at the time; placing the patient in suitable occupation as soon as possible, to avoid the bad mental effect of being unemployed."

An element of social justice, not yet firmly established or, one might say, yet conceived of in most parts of our country, for the proper benefit of cardiac patients, is some form of compulsory disability insurance which will provide for financial help where employment is responsible for the development, or extension of cardiac disease, or death from it.

The probable relationship of cardiac infection to diseased tonsils is so firmly believed that we should consider our ability to meet the necessities of this situation. How many of the children of a city need to have their tonsils removed? According to Dr. Geo. Goler of Rochester, 2.6% of the total population, or 6.5%

of the children under 15, need tonsillectomy to save them from various direct and indirect results of infection through this portal of entry. In New York City, in 1920, a careful study, based on medical examination of school children, showed that about 55,000 children needed tonsillectomy. As a matter of fact, 46,273 operations for tonsillectomy were performed, and chiefly for children, in the hospitals and dispensaries of the city during 1920. It is believed that by proper central coördination, all tonsillectomies that are needed can be arranged for in existing facilities. Somewhere between 1% of the total population per annum estimated as needing tonsillectomy, in New York City, and the 2.6% considered to be in need of this treatment in Rochester, probably lies the truth of the situation. Possibly the reduction of tonsillar tissue and exclusion of infection from the cicatricial tissue by x-ray treatment, may simplify this problem. Similarly, the requirements and facilities for correction of oral sepsis should be studied and met. The present day inadequacy of prophylactic and curative dental care for old and young, is too well known to dwell upon here.

Why, then, do we say that the prevention of heart disease is a practical public health problem?

Because it is the cause of the greatest number of deaths and disabilities in the United States;

Because cardiac diseases fall within the class of preventable diseases, since their exciting causes, or infections, are severally communicable or preventable diseases, or both;

Because the individual has not the knowledge to, nor can he, control his life and environment, his schooling, treatment, employment or hazards of life alone, or escape by his unaided, individual efforts, the origin and development of these diseases.

Can we not expect that the extension of control of the water and milk supplies, the further reduction of the exanthemata, the infections of tonsils, teeth, and of the respiratory tract, will presently reduce the incidence of heart disease among the children of today so that the death rates of thirty and sixty years from infection will be reduced? Is it too much to believe what we have already seen, beginning in the past two years, the increasing vacancies in hospitals for care of the tuberculous, may with a hoped-for 50% reduction in this disease in the next thirty years, become so general that these sanatoria, for the most part ideally suited to, or easily adaptable for, the care of cardiac convalescents, will be turned into great salvage plants and training schools for the incipient, moderately advanced, arrested and active cases of cardiac diseases.

The reduction of typhoid has been so conspicuous and the permanence of its control so assured that we have a right to prophesy a reduction of that group of myocardial deaths shown to bear a direct relation to previous typhoid infection.

We do not know that syphilis has been reduced, but we believe this can be accomplished. We do know that scarlet fever, measles, pertussis and diphtheria are less frequent causes of death by 50-80%, than they were fifty years ago. It is suspected from some rather inconclusive hospital records that acute articular rheumatism has been reduced in recent years, and it is supposed that this is, in part, due to the removal of infected tonsils, the compulsory pasteurization of milk in our large cities, and the extension of oral hygiene, with its accompanying reduction of oral sepsis. (Dr. Alexander Lambert reports a reduction in admissions for acute rheumatic fever during the period 1907-1919, at Bellevue Hospital, from 2.45% of all hospital admissions to .52%.)

We see in the great incidence of cardiac diseases and deaths a token of our degree of failure in a crude, inconsistent and incomplete program of preventive medicine. These deaths and disabilities, represent the vouchers of our administrative stinginess, our policy of parsimony toward our health services. Even though we have no panacea or specific, we cannot be excused for letting the products of our carelessness march in an increasing army to the grave.

What is our professional answer, our program for action? First, we must make the possibility of prevention, prevention of infection, prevention of cardiac damage, prevention of extension of lesion or disability, and postponement of death from heart diseases, real to the practitioner of medicine.

As Dr. Thomas McCrae has well said:[4]

"The problem facing both general practitioner and consultant is to detect the persence of lesions in their early curable, or healable stage, and to recognize the first indications of failure of an established balance, reserve, or compensation."

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[4] Penn. Medical Journal, February, 1920, Vol. xxiii, p. 267.

All this means the introduction of a consciousness, a definite knowledge, and interest in the prevention of heart disease through medical education. We can no longer await the coming of patients in our offices, but must search for them among the presumably healthy and attack their disabilities before the patient is aware of them, and this through a development of a habit in the whole community to seek a thorough medical examination once a year for adults, twice a year for children under fourteen, and always after apparent recovery from any acute febrile disease.

We owe it to the great cardiac population of our country to release them from the traditional medical inhibitions, to encourage use instead of permitting atrophy. We owe the public intelligent warning of the seriousness of the rheumatic infections. The public owes us adequate provision of those institutional facilities we need for their care, and suitable training in self-support. Organized groups under medical leadership are necessary to develop the resources of our communities for the prevention and relief of heart disease.

The research problems that crowd upon us cover a wide field of laboratory sciences, medical practice and social economics, and involve the medical and associated professions. It is to be noted that public health and problems in prevention are subject to the same limitations which apply to the practice of personal medicine, namely, that treatment to be effective, or permanent in results, must be based on accurate diagnosis, and that communities differ almost as widely in their idiosyncrasies, their resources, their reaction to advice, as do individuals. No detailed recommendations, therefore, are offered for the remedy of the conditions of your respective communities based on diagnosis and treatment elsewhere, but may I hope that as you think over the symptoms and proofs of a widespread public disability which I have offered, you will search for the causes in your own environment and take an active part in the attack upon heart diseases with the determination characteristic of courageous and well informed physicians everywhere. Your Hippocratic oath requires this of you.

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"On the Value to the Community of Organized Effort for Control of Heart Disease," Lewis A. Conner, M.D. Read at stated meeting of College of Physicians, Philadelphia, May 4, 1921. (To be published.)
"Convalescent Institutions in the Care of Heart Disease." Read at stated meeting of College of Physicians, Philadelphia, May 4, 1921. (To be published.)

THE Manufacturers of Calox announce that liberal samples of Calox will be sent to any physician interested in becoming familiar with the product. Write: McKesson & Robbins, Inc., 91 Fulton Street, New York City.

Original Article.

THE ESSENTIAL FACTORS OF CANCER CAUSATION.

BY JAMES W. SHANNON, M.B., SAN DIEGO, CALIFORNIA.

(Continued from page 573.)

It is impossible to follow the course of water through the whole of the alimentary tract for the reason that, after leaving the stomach, it gradually becomes absorbed. We know, however, that it passes rapidly through the mouth, pharynx, and esophagus until it reaches the stomach, *where it is retained for a considerable time,* and that after leaving the stomach, there is no obstruction to its passage through the duodenum or other portions of the intestinal canal. The only important difference, therefore, between the stomach and the mouth, pharynx, esophagus, or duodenum is in the greater length of time during which water is retained therein, and it is for this reason only, and not because lesions are present more frequently in the stomach than in other parts, that gastric cancers outnumber cancers of all other abdominal organs together. The attack of cancer falls on the pyloric region because it is the most common seat of gastric lesions, but inasmuch as there is good reason to believe that lesions of the buccal cavity and of the duodenum are more frequent than in the pyloric region, we can hardly doubt that, if the opportunities for exposure of lesions in all these parts to water were equal, cancers of the mouth and duodenum would then outnumber cancers of the pylorus.

With regard to other parts of the alimentary system, our knowledge of lesions and of their exposure to water is insufficient to warrant our forming any conclusions. Nevertheless, if we believe that the principle of coöperation between lesions and water is true in the case of cancers of the mouth, stomach, and duodenum, we must also believe that it is true in the case of the intestines, peritoneum, liver, and other parts of the alimentary system lying beyond the range of observation. There is reason to think that cancer of the rectum is due, not to water which has passed through the alimentary canal, but to water deliberately applied in the course of the treatment for constipation and other affections.

Probably no organ or part of equal size is so frequently the seat of affections tending to result in lesions as the lungs, but notwithstanding this, there are few parts or organs in which lesions are better protected from water, or which show less tendency to become cancerous. The lungs, however, are not peculiar in this respect, since a brief consideration of the facts of cancer incidence as a whole will show that, whereas the greater proportion of the risks from cancer are borne by parts and organs which are commonly exposed to water, there is, in all parts and organs protected from such exposure, a remarkable freedom from the disease. It would be difficult to find a better illustration of this than that which is supplied by a comparison of the facts of cancer incidence upon the lungs and upon the stomach. Lesions are present more frequently in the lungs than in the stomach, and if "chronic irritation," or any other form of stimulus associated with their presence, were capable of causing cancer, we should certainly expect pulmonary cancers to outnumber gastric cancers. Since, however, the contrary is true, it is obvious that lesions acting alone cannot cause cancer, and it therefore becomes impossible to find a satisfactory explanation for the facts except on the ground that, whereas in the stomach exposure of lesions to water is almost continuous, the opportunity for such exposure can only arise in the lungs in the event of a rare accident.

Cancer of the female generative system stands second in order of frequency to cancer of the alimentary organs, not because it is more exposed to injurious influences or to water than many other parts of the body, but because of the vulnerability of one point, namely the cervix uteri. In so far as cancer is concerned, the cervix uteri stands in the same relation to the female generative system as the pyloric region does to the alimentary system, that is to say, it is the point upon which nearly the whole weight of the disease is focussed. It seems reasonable, therefore, to believe that the principles of causation which were found to be applicable to the problems of cancer in the alimentary system, will also serve to explain cancer of the female generative organs with the same degree of consistency.

The cervix uteri is, par excellence, the seat of inflammations, lacerations, ulcerations, erosions, and other lesions having a tendency to persist for months, or even years, and moreover, it is most favorably situated for contact with any water which may happen to enter the genital passages.

The female generative organs are not designed for the reception of water, and its presence in any part thereof must be regarded as abnormal; nevertheless, it is an exceedingly common event, Water may unintentionally enter the genital tract in the ordinary course of bathing, or it may be introduced deliberately as a routine measure of cleanliness, for purposes of medical treatment, and for other reasons. Having once gained an entrance, it is to be noticed: firstly, that owing to the absence of evaporation and to the impossibility of removing it by any ordinary means, it remains in contact with the mucous surfaces and with lesions which may be present thereon for an indefinite length of time, and, secondly, that women who are the subjects of female diseases in general, and of cervical lesions in particular, are more likely, both for reasons of treatment and of cleanliness, to resort to the use of water than those whose organs are healthy. Thus it happens that lesions actually invite the presence of water in the female genital tract.

Cancerous manifestations in the fundus uteri, ovary, and other parts of the female generative system are rare, not because of the absence of lesions therein, but because by their situation and structural design they are protected from contact with water. Theoretically, it is possible that water or the living organisms which it contains may enter the uterine cavity and even penetrate as far as the ovary, but, having regard to the fact that these parts can only accommodate a very small quantity of water, it is certain that, even under the most favorable circumstances, they can never be exposed to water, or to the causative agent of cancer on a scale comparable to that of the cervix uteri.

When regarded superficially it might seem that cancer of the mammary gland is a departure from the rule that cancers originate at the site of preëxisting lesions, but inasmuch as any difficulties which the subject may appear to present depend, not upon a deviation from the principles of cancer causation advocated herein, but upon the sense in which the terms, "site" and "lesion" are construed, they are more apparent than real. It was said in the foregoing that the rôle of lesions in the causation of cancer is that of a channel, passage, or gateway through which the causative agent of the disease is conveyed in water to the living cells of the tissues, and if the term, "lesion" is interpreted in this sense, all considerations concerning its physical character are immaterial. In so far, therefore, as the ducts of the mammary gland are capable of serving as a channel through which water and the living organisms contained therein may gain access to the cells of the mammary substance or to the cells of the ducts *themselves*, they may for the purpose of cancer causation be regarded as a lesion, regardless of whether they are diseased or healthy. The site of breast-cancer cannot be foretold with the same definiteness as in other cases; it may be any part of the duct or glandular tissues to which water happens to gain access.

The mammary ducts, fifteen to twenty in number, converge from all parts of the gland towards the summit of the nipple where they open on the surface. Having no valves or other controlling mechanism, they are unable to offer resistance to the passage of fluids in either direction. We may judge of the possibilities with regard to the passage of water from without inwards by the fact that during the period of lactation the flow of milk through them is independent of control. Under these circumstances, it is more than probable that in the course of bathing, either by aspiration, pressure, or capillary action, water is carried to the deeper parts of the gland. The changes which supervene upon the cessation of reproductive activity are calculated to increase the potency of the mammary ducts, and thus favor the entrance of water and the possibilities of cancer in the breasts of older women.

Independently of the foregoing considerations, there is indisputable evidence that mammary cancers result from exposure to water, but before it can be fully understood, it is necessary to become familiar with certain customs of the Japanese. The reputation of the Japanese for personal cleanliness is well known. A daily bath is a national custom scrupulously observed by all persons in every class of society; but it is important to notice that, with rare exceptions, the Japanese never bathe in cold water. The bath is prepared in the evening, and by a heating device is maintained at a temperature of 113° F. to 115° F. Beginning with the head of the family, the same water is used by each member of the household in succession, including guests and servants, so that often it requires several hours to complete the process.

(To be continued.)

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MUTUAL INSURANCE FOR PHYSICIANS.

THERE seems to be an increasing tendency to sue physicians for alleged malpractice. This inclination may be based on honest conviction that a doctor has been careless or unskillful, a desire to extort money, the suggestion of friends, or advice of attorneys. Medical practitioners are not always businesslike in recording facts and, as a rule, do not impress juries favorably by testimony on the witness stand, hence are sometimes victimized by force of circumstances. It is generally recognized that evidence of disability, or suffering, arouses sympathy in the minds of jurors, and the workings of untrained intellects do not always lead to logical conclusions. It must also be recognized that a proportion of the people respond to arguments designed to discredit the practice of medicine. The increasing number of suits, with the necessity for defence or compromise, has led some insurance companies to publish notices which announce the intention to increase rates. Physicians are already burdened by various forms of licenses, greater cost of transportation, taxation of income and many minor items: hence any method of coöperation which may tend to reduce expenses is pertinent.

A plan to form a mutual insurance company with membership confined to members of the Society, has been considered, legal advice obtained and some details formulated. A company of this sort cannot legally do business unless it is incorporated according to Massachusetts laws. The only serious obstacle is the initial expense, for the law requires that paid up premiums amounting to fifty thousand dollars ($50,000) must be secured before functioning as an insurance company. This is not insurmountable, for a mutual company can pay back in dividends a substantial proportion of its unused income after providing for a reserve fund.

The JOURNAL office will be placed at the disposal of a company if physicians are interested and decide to incorporate it. By this plan, the JOURNAL would provide all the bookkeeping, receive payments and deposit funds under the direction of the corporation. If the officers would be willing to serve without salaries, the only expense would be for a part-time clerk, unless the business should develop into larger proportions than now seems probable. There would be no charge for rent or salaries, and the Editor of the JOURNAL would give bonds to protect the company against possible loss. Under these plans there would be no overhead expense, which contributes largely to the cost of insurance by companies organized for profit, or for the purpose of furnishing employment for officials.

The same auditor now employed by the Massachusetts Medical Society could examine the details of financial transactions and report to the company at less expense than would be the case for an independent organization. This company need only meet the expense of actual damages awarded, if any, as a result of any suit, for the Society now provides legal defence and, if the company should elect to have its members take advantage of the Medical Defence Act, another large item of overhead expense in insurance business would be eliminated.

If members of the Society are interested in discussing this plan, the JOURNAL would make all announcements and preliminary arrangements, provide for meetings, employ counsel necessary in securing a charter and serve the members of the Society in any way which may be desired.

There are now nearly four thousand members, a large proportion of whom carry liability insurance.

A board of managers could pass upon questions relating to any suit, and decide upon the course to be pursued after conference with counsel provided by the Society.

It has often been suggested that physicians may have to organize for defence against various matters affecting the profession. Here is an opportunity for testing the advisability of organization in a matter of common interest.

NARCOTIC REGISTRANTS MUST RE-REGISTER THIS MONTH.

The Internal Revenue Office is paying narcotic registrants its annual call again, to remind them that they must re-register on or before July 1, if they intend to continue handling or prescribing narcotic drugs for the period July 1, 1921, to June 30, 1922.

Practitioners, hospitals, sanatoriums and educational institutions, which constitute Class 4 of the Revenue Department's classification of registrants, have been mailed proper forms to be filled out and returned to Collector John J. Mitchell with payment of $3.00, the annual amount of tax, prior to the beginning of the period. To avoid the penalty imposed upon 1500 delinquents a year ago, they will execute the forms promptly.

Slight misunderstanding of the requirements of the Harrison Narcotic Law and amendments has arisen among practitioners, who believe they do not have to register with the Internal Revenue Office if they do not actually handle or dispense narcotics. The department has ruled that although he does not actually dispense, a physician must be registered if he wishes only to prescribe narcotics, as the registration number must be on all these prescriptions. This misunderstanding was the result of many penalties being imposed last year.

Persons desiring to discontinue handling narcotic drugs after July 1, should notify the Internal Revenue Office prior to that date so that proper steps can be taken legally to terminate the business, return all unused forms and have registration numbers cancelled. Should any person go out of business and not notify the Revenue Department, he will be carried on the bureau's records under his original registration number, and after July 1, this will cause him to be classified as a delinquent.

Instructions sent out with the forms this year call attention to the important fact that all registrants in Classes 1, 2, 3, and 4, must also register in Class 5 in order to dispense or deal in exempt preparations, although this additional registration does not require any further payment of tax.

They are also reminded that persons registering in Classes 3 (retail dealers) and 4 must prepare, under oath or affirmation, a duplicate inventory of all non-exempt narcotic drugs and preparations in their possession on the date of application, or submit an inventory of any date between the previous December 31 and the date of application when they register.

MEDICAL NOTES.

Rural Health and Medical Service.—Minutes of meeting for organization of Committee for Rural Health and Medical Service, held in Boston, Friday, April 29th, at 11 A.M., in the office of Dr. Kelley, Commissioner of Health.

Those present were: Dr. E. R. Kelley, Commissioner of Health; Mrs. William Lowell Putnam, of Woman's Municipal League; Dr. E. H. Bigelow, Chairman Public Health Committee of the Massachusetts Medical Society; Mr. Leslie R. Smith, Master of the State Grange, representing Commissioner of Agriculture A. W. Gilbert; Dean E. M. Lewis, representing President K. L. Butterfield of the Massachusetts Agricultural College; P. W. Goldsbury, and Prof. Walter B. Cannon of the Harvard Medical School and member of the American Medical Association Council on Public Health and Instruction.

Prof. E. M. Lewis was elected temporary chairman. The following permanent officers were elected: President, Kenyon L. Butterfield of Amherst; Vice-Presidents, Dr. Eugene R. Kelley of Boston and Dr. Walter B. Cannon of Cambridge; Secretary, Dr. Paul W. Goldsbury of Deerfield.

Dr. Goldsbury reported having gone about Franklin County, visiting some twelve towns. Four of these trips were made with the Farm Bureau team, and he had had an opportunity to meet groups of people and speak briefly of plans for advance of health conditions. He had had more or less extended interviews with some 24 physicians in regard to their own problems and sounded them out with reference to the building up of a more unified clinic in Greenfield as a Centre. This clinic to include, at the first, tubercular, mental and venereal disease cases and, possibly, orthopedic cases. He described a number of these towns, how they were situated in reference to good roads, railroad lines of travel, and how they were manned by physicians, thus illustrating a need for better hospital facilities and an extension of clinical education. He also spoke of the interest that leading medical men in Boston had shown toward giving services to inaugurate such clinics at a distance from Boston. He emphasized the fact that the extension of the Home Economics work of the Farm Bureau coming up, as it did now, to the subject of nutrition, school lunch problems, etc., and the pretentious plans of social service agencies—Red Cross Society, the Public Health Associations for district and county nurses, warranted better unification of the interests of the physicians and such organization as would keep them abreast of all these advances.

Dr. Cannon has been a member of the Council of American Medical Association on Public Health and Instruction since such council was organized. He told of the work organized and developed by Dr. F. E. Sampson of Creston, Iowa, and now carried along by the Greater Community Hospital Association, which affords hospital facilities to a group of counties about, and which is designed to "promote interest and activity through auxiliary associations and societies or otherwise, throughout the neighboring communities in measures tending to conserve the public health and prevent disease and disability." The work has been a basis for modelling permissive legislation in some 20 states. Dr. Cannon hoped the Committee could meet Dr. Sampson when he would be in Boston June 6-10, at the sessions of the American Medical Association.

Committee on Rural Health and Medical Service.

The "country" is the natural playground of health. Conditions should be provided to insure there all the comforts and advantages of modern life and its individual and social efficiency.

Objects.

To bring together all agencies devoted to rural welfare.

To promote cordial coöperation between the older and newer agencies so engaged.

To assure the highest usefulness of the country physician who gives of his best strength and service to the maintenance of the life, health, and welfare of the community. The family doctor has been a home and individual stabilizer. In the general practice of medicine, there exists an unusual opportunity to minister to the sanctity of the home, the integrity of family life, and to a protection of the individual's private interest, and in the rural field where the doctor is placed, he renders invaluable aid, not only professionally, but with his intimate knowledge, training, and experience with the human constitution and fabric, he is especially fitted to uphold the social life of the community and maintain its fullest integrity. Medical service must be given support in the way of modern comforts and equipment, conveniences, good roads, etc., all of which has an effect upon the stimulus and circulation of individual and community life.

To make such personal acquaintance with each field as will attract and encourage the support and active coöperation of all local agencies and leaders.

To help to bring to rural and needy sections better hospital advantages.

To endeavor to provide better educational and clinical facilities necessary for attracting and retaining men of competent professional ability to serve such districts.

Committee:

Dr. E. R. Kelley, Commissioner of Health, Boston; Prof. Walter B. Cannon of Harvard Medical School, and member of Council on Health and Public Instruction of American Medical Association, Cambridge; Dr. K. L. Butterfield, President Massachusetts Agricultural College, Amherst; Dr. Arthur W. Gilbert, Commissioner of Agriculture, Belmont; Dr. Payson Smith, Commissioner of Education, Boston; Dr. Alfred Worcester, President Massachusetts Medical Society, Waltham; Dr. E. H. Bigelow, Chairman Public Health Commission of the Massachusetts Medical Society, Framingham; Dr. G. H. Wright, Harvard Dental School, Brookline; Mrs. William Lowell Putnam, Boston; Dr. Paul W. Goldsbury, Deerfield.

The statement of the general purposes of the organization as outlined by Dr. Goldsbury, was discussed and was accepted, with the elimination of a minor paragraph.

Matters relating to the promotion of the work, and especially to ways and means of financing it were discussed. The opinion was expressed that counties and districts most to be benefited should be solicited, as far as possible, to bear the burden of expense associated with the work and that societies and associations should be interested to have the work presented to them and appeals made for its support.

A finance committee was appointed: Mrs. William Lowell Putnam, chairman; Pres. K. L. Butterfield and Dr. E. H. Bigelow. The matter of finding a man who could give time and interest essential to act as treasurer, was brought up. Meeting was adjourned.

Paul W. Goldsbury, *Secretary*.

Since notification to President Butterfield of his selection as President, I have received the following from him, dated Amherst, May 7, 1921:

"My dear Dr. Goldsbury:—I want to help in the scheme proposed, but I can't accept the chairmanship of the committee. I have pledged myself, already, to all the work outside the administration of the college that I can possibly carry in justice to the college and myself, as well as the schemes undertaken. Somebody else must act as chairman. Yours very truly, (Signed) Kenyon L. Butterfield."

Since our meeting, also, communication has been had with Dr. F. E. Sampson of Creston, Iowa, and our next meeting will be planned during the week of the meeting of the American Medical Association, June 6-10, with a view to meeting with Dr. Sampson and taking up certain few important matters. Card will be sent out as to time and place of meeting, later.

Paul W. Goldsbury, *Secretary*.
Deerfield, May 17, 1921.

Mme. Curie's First American Contribution.—The July issue of the *Medical Review of Reviews* will contain a lengthy original contribution by Mme. Curie entitled "The Radio Elements and Their Applications." It is, we believe, the first and only contribution which this noted scientist has made to an American publication, and is extremely valuable. A copy of the July issue containing it will be sent gratis to any physician making the request.

Address, *The Medical Review of Reviews*, 51 East 59th Street, New York.

A Handy Little Reference Book.—Parke, Davis & Company recently issued a little reference book on Adrenalin that is conveniently arranged for ready consultation.

Adrenalin is the original natural preparation of the active principle of the suprarenal gland. It is a vastly better product than any synthetic compound, and under the present highly perfected process of manufacture it is a stable and dependable preparation of uniform strength.

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NOTES FROM DISTRICT SOCIETIES.

Dr. Edward W. Bartol has recently located in Lancaster to take the practice of the late Dr. Chester C. Beckley. Dr. Bartol has been elected to the Staff of the Clinton Hospital.

Dr. Edward B. Bigelow has resigned from his position as Supervisor of the Medical Service at the Worcester City Hospital and has accepted the position as Assistant Medical Director of the State Mutual Life Assurance Company. He retains his position as Visiting Physician to the Worcester City Hospital.

Dr. F. E. Garland, for the Health Committee of the Massachusetts State Medical Society, has been at the Worcester City Hospital during the past week, demonstrating the Schick Test. This is a part of a state-wide campaign undertaken by the committee to introduce this method of reducing the mortality in the state from diphtheria.

Dr. Homer Gage has been recently elected president of the Worcester Welfare Association.

Hampden District.—The Springfield Academy of Medicine held a special meeting Tuesday, May 24, 1921, and passed the following resolution: "We, the members of the Springfield Academy of Medicine, are familiar with the medical needs of this city, and hence are convinced that there is at the present time no need for a free medical dispensary. However, should future development reveal the need of some such agency, we are convinced that from the viewpoint both of public health and of civic economy, existing institutions should be utilized, rather than that an expensive duplication of plant and equipment be made an added charge upon the community."

The Junior Chamber of Commerce, the energetic offspring of the Springfield Chamber of Commerce, has been, with all the enthusiasm of youth, for some time agitating the opening of a free medical dispensary in Springfield. The agitation succeeded in eliciting the support of enough philanthropic individuals and charitable institutions to warrant a rather formidable organization of Junior Chamber of Commerce members bent on establishing such an institution. A definite plan was publicly presented, with estimates of the probable initial expense and annual cost of maintainance. A circular letter was sent to every physician in the city, soliciting not only approval of the project, but gratuitous service in the dispensary as well. A few favorable replies were received, but for the most part, physicians simply dropped the appeal in the waste basket. Much was publicly made, however of those few favorable replies, and the Junior Chamber of Commerce was about to go to the public for funds. This contemplated action brought about the special meeting of the Springfield Academy of Medicine, with results as stated. At the same time, the Directors of the Community Chest which collects and disburses funds for all the well organized and well conducted charities in the city, issued, after careful consideration, the statement that they did not endorse the project for a free medical dispensary, because they deemed it at present, extremely ill-advised. The agitation will probably, therefore, for the time being, be abandoned. Eventually, when the times are more propitious and when the need for such an institution is more clearly demonstrated, a compromise can be effected whereby the need will be met by establishing such an agency in connection with an already existing charity.

Allen G. Rice.

BOSTON AND MASSACHUSETTS.

New England Surgical Society.—The next meeting of the New England Surgical Association will be held at Worcester, Massachusetts, on September 21 and 22, 1921. Headquarters, Hotel Bancroft. There will be clinics at the Worcester City Hospital, Memorial Hospital, and St. Vincent's Hospital on the morning of September 21st. After the reading of papers during the afternoon session, Doctor and Mrs. Homer Gage will entertain the members at tea at Shrewsbury. The second day will be devoted to a continuation of the scientific program. Members are invited to present contributions of their own selection, and are requested to notify the Secretary promptly, in order that the program may be completed as early as possible. The time allowed for the reading of papers shall be fifteen minutes, and five minutes for each speaker during the discussion, excepting invited guests. Members are requested to notify the Secretary, P. E. Truesdale, 151 Rock Street, Fall River, Mass., if lantern slides are to be shown.

Week's Death Rate in Boston.—During the week ending May 21, 1921, the number of deaths reported was 193 agaisst 239 last year, with a rate of 13.29 against 15.42 last year. There were 29 deaths under one year of age against 43 last year.

The number of cases of principal reportable diseases were: Diphtheria, 72; scarlet fever, 51; measles, 100; whooping cough, 15; typhoid fever, 5; tuberculosis, 54.

Included in the above, were the following cases of non-residents: Diphtheria, 9; scarlet fever, 4; measles, 1; whooping cough, 1; typhoid fever, 2; tuberculosis, 11.

Total deaths from these diseases were: Diphtheria, 5; scarlet fever, 2; measles, 1; tuberculosis, 13.

Included in the above, were the following cases of non-residents: Diphtheria, 3; tuberculosis, 2.

NOTICES.

During the A. M. A. Convention the Medical School Building and Laboratories of Tufts College, located at 416 Huntington Avenue, will be open for inspection from 9 a.m. to 4 p.m. There will be exhibits of experimental work on focal infections in the Pathological Laboratory. The Departments of Physiology, Biological Chemistry and Histology will also present interesting material. A survey of the distribution of the graduates of medical schools, as affected by the attractions of urban *vs.* rural centres, will be shown.

Lecture Courses with Clinics for teachers, nurses, and physicians, relating to speech correction and development, will begin at the Northwestern University Summer School, June 27 and July 25, 1921. For particulars apply to Walter B. Swift, M.D., 110 Bay State Road, Boston

RECENT DEATH.

Dr. Le Grand Blake, a Fellow of the Massachusetts Medical Society, died at his home, Riverside, R. I., April 22, 1921, aged 67 years. He was a graduate of Tufts Medical School in 1894.